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AUTHOR Knupfer, Nancy Nelson
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ABSTRACT

One step toward promotion of equitable educational computing is to provide teacher education based on a better understanding of the machine/human interface, including the dynamics of teachers' decision-making about computer use. To test this notion, a study was conducted to investigate the relationship between elementary teachers' "psychological types" and their uses of instructional computing. The null hypothesis--that there is no relationship between these "types" and teachers' reactions to instructional computing--was tested. Subjects were 60 elementary school teachers who taught on a full-time basis across the general curriculum in three schools with the same socioeconomic population of students. The Myers-Briggs Type Indicator (MBTI)--a questionnaire used widely in counselling, psychology, and education to determine "psychological type" (extroversion/introversion; sensing/intuition; thinking/feeling; judging/perceptive)--was administered to all participants. Chi-square statistics revealed a significant relationship between specific MBTI dyads and several dependent variables: i.e., the amount of training teachers had taken through district-supported classes; feelings of adequacy of training; whether or not the principal encouraged computer use; factors which make it difficult to use instructional computing; and opinions about the quality of available software. Another important finding was that the school principal appeared to be the most influential person in determining how computers were used in each school. A discussion of ways in which to better involve the different "psychological types" in instructional computing concludes the paper. (27 references) (CGD)

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Author:

Nancy Nelson Knupfer

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The Relationship Between Elementary Teachers' Psychological Types and Their Uses of Educational Computing

Nancy Nelson Knupfer, Ph.D.
Assistant Professor

Educational Media and Computers
College of Education
Arizona State University
FMC-Payne 146
Tempe, AZ 85287-0111

Paper prepared for presentation at the Annual Convention of the Association of Educational Communications and Technology, Dallas, TX, February 1-6, 1989.

The Relationship Between Elementary Teachers' Psychological Types and Their Uses of Educational Computing

PURPOSE

Many factors operate within a school to determine both the quantity and quality of a student's computing experience; one critical factor is the classroom teacher (Knupfer, 1987a, 1987b). The influx of microcomputers into American schools has been viewed differently among teachers, leading some teachers to use computers with their students while others do not. Further, teachers who do use educational computing do so in a wide variety of ways.

Because the teacher's role is central in determining a student's computing experience, the field needs to be able to specify factors which make one teacher an enthusiastic user of educational computing while another teacher refuses to use the technology. One factor which might influence teachers' decisions about using computers and further, the type of usage they employ, is their "psychological type." Although many studies have investigated psychological type as a factor in career decisions and group dynamics, none have explored it's impact on teachers' decision-making processes within the areas of instructional computing.

The objective of this study was to investigate the relationship between elementary teachers' "psychological types" and their uses of instructional computing. "Psychological type" was determined by the Myers-Briggs Type Indicator (MBTI), a standardized instrument developed to help understand how people perceive experiences and decide what to do about them. .Uses of instructional computing were determined by teacher interviews and logs of students' computer usage.

The researcher sought first to determine if there was any relationship between the teachers' "psychological types" and their decisions to use/not use computers. For computer-using teachers, the researcher further sought to determine if there was any relationship between particular kinds of computer use and teachers' "psychological types."

Significance

Because computers are playing an increasing role in all aspects of American society, it is critical that all students have some familiarity with computer technology (Barbour, 1989). However, some teachers refuse to use computers, causing their students to miss the opportunity. Lack of opportunity to use computers may be particularly damaging to minorities, young women, or less well-behaved students who have traditionally had less access to technology (Edwards, 1984; Komoski, 1983; Lautenberg, 1984; Nathan, 1983; Schubert & Bakke, 1984). In planning for instructional computing teachers need to consider equity for those student groups as well as for students of different ability groups.

One step toward promotion of equitable educational computing is to provide teacher education based on a better understanding of the machine/human interface, including the dynamics of teachers' decision-making about computer use. This study investigated "psychological type" as a factor which might influence teachers' decisions about computer usage. It further proposed to allow information about instructional computing to emerge through teacher interviews. The resulting factors which influence teachers' decisions can be considered in developing training programs for preservice and inservice teachers. Such training might be designed according to the MBTI suggestions for accommodating individual learning and teaching styles (see Myers, 1975).

LITERATURE REVIEW

Several studies have documented teachers' ongoing confusion about how to integrate computers into the traditional classroom structure and resulting inequities in students' computing experiences (Alvarado, 1984; Anderson, Welch & Harris, 1984; Becker, 1986; Edwards, 1984; Jungck, 1985; Knupfer, 1987b; Lesgold & Reif, 1983; Schubert & Bakke, 1984; Sheingold, Kane, Endreweit, & Billings, 1981). Quantitative inequity prevails when the machines are not available and qualitative inequity results from differences in the type of instructional use (high skill level and low skill level) to which students are exposed. If low-level activities encourage rote memorization under the control of the program, and high-level activities promote independent thinking and stimulate curiosity, then the degree of the learner's exposure to these techniques can either stunt or improve their cognitive abilities (Knupfer, 1987b; Patterson & McLellen, 1986). The selection of instructional activities therefore, can promote or retard the learner's heuristic, cognitive development, putting a premium on assuring not only equal access to computers for all students, but also on equal access to the different kinds of educational computing activities.

The method by which any innovation is implemented is significantly more important than the actual subject of the implementation in determining the innovation's success (Berman & McLaughlin, 1976). It follows that the way computers are used is more important than the fact that the machines are sitting in school buildings. Recent research has shown that a final arbiters of classroom activities, regardless of administrative mandates, teachers will shape any implementation effort to fit their own situations (Cuban, 1986; Fullan, 1982; Jackson, 1978; Weinshank, Trumbull, & Daly, 1983).

A study of teachers' reactions to instructional computing (Knupfer, 1987b) revealed that less than 30% of the elementary teachers used computers. Further, teachers believed that average and remedial students were limited to software which promoted low-level thinking skills, while advanced students used the computer mostly to promote the higher-level thinking skills. In spite of common complains of time shortage, inadequate training, poor software, and lack of both equipment and program objectives, Knupfer found that there were some teachers who attempted instructional computing while other teachers flat out refused. Knupfer suggested a need to investigate factors which might influence teachers' decisions to use or not use instructional computing.

One measure of the way people make judgments and decisions is the Myers-Briggs Type Indicator.(MBTI). This instrument is based on the work of Carl Gustav Jung, who published *Psychological Types* in 1921 as a way of helping people to understand themselves and others (O'Brien, 1985). According to Jung, people differ in their perception and judgment styles. Perception is the way they become aware of things and judgment is the process of reaching conclusions about those things. People can perceive things in two distinct ways, by sensing or by intuiting. Sensing individuals tend to prefer concrete facts and are good with details, while intuiting people tend to be more creative and dislike routine. People are also able to make judgments through two distinct methods, thinking and feeling. Thinking people evaluate information in an impersonal, logical fashion, while feeling people evaluate information on the basis of values.

Isabel Briggs Myers and Katherine C. Briggs expanded on Jung's theory and in 1943 constructed the four dimensional MBTI to measure type preferences (Myers, 1962). Among other things, the MBTI has been used to study groups of people (Graves & Graves, 1973), the performance of school principals (Brightman, 1984), teachers' behavior (DeNovellis & Lawrence, 1983), and student achievement (Myers & McCaulley, 1985). Although various researchers have used the MBTI to study teachers and some have even tried to change the teachers' "psychological types" through directed instruction (Dettmer, 1981), no one has investigated the relationship between teachers' "psychological types" and their reaction to instructional computing.

METHOD

Subjects

The subjects were sixty elementary (K-6) school teachers who teach on a full-time basis across the general curriculum. The teachers represented three schools, all within the same general neighborhood and with the same socio-economic status. Each school had a large population of minority students and each qualified for Chapter I funding. After a decision from the principal and the teachers' "computer committee", all teachers (29) from one school were included in the study. The researcher solicited volunteers from the other two schools; the second school had a sizable number (21) and the third school had the fewest (10).

Materials

Myers-Briggs Type Indicator (MBTI) -- The MBTI is a questionnaire used widely in counseling, psychology, and education to determine "psychological type." The essence of the MBTI is that behaviors are influenced by the way in which people prefer to take in information and make decisions. Four preference types are measured: 1) Extroversion/Introversion (attitude toward life); 2) Sensing/Intuition (two kinds of perception); 3) Thinking/Feeling (two kinds of judgment); and, 4) Judging/Perceptive (attitude for dealing with the environment) (see Figure 1). The instrument, which was developed during the 1940s and revalidated in 1977, is both reliable (95%) and valid (Myers, 1975).

The instrument categorizes people into 16 different types based upon a combination of the four scales (see Figure 2). The MBTI is not meant to stereotype people, but to indicate their preferences when making judgments and decisions. Each type has certain characteristics by which it can be recognized, but no type is rigidly set. In any practical sense, it would be difficult to address the needs of 16 different "personality types" when planning teacher training within any one school building, so this study focused on the four main variables that comprise the 16 types.

Two versions of the instrument contain 126 (Form G) or 166 (Form F) questions., and a shorter 50 question version (form AV) was recently released. Although the shorter version is self scoring, it is not nearly as reliable as the longer versions. This study used Form G, which is now the standard. The subtle questions indirectly tease out the type preferences through forced-choice answers between two possible responses.

Interviews -- Unstructured interviews (Guba & Lincoln, 1981) with the teachers elicited information about decisions regarding computer use. The interviews included a set of common questions to serve as a base, such as "What effect has educational computing had on the structure of your curriculum?" and "What are some problems you've had with instructional computing?"

Student Logs -- Student-maintained logs of computer activity, including the frequency, duration, and kind of task were monitored by the researcher. When using courseware, the students noted the title of the courseware and what they did on the log. The researcher determined what kind of activity (low-level or high-level) the courseware represented. The logs collected actual data about the students' computer use, which could be compared to teachers' beliefs about that use.

Hypothesis

This research tested the null hypothesis that there is no relationship between teachers' "psychological types" and their reaction to instructional computing. Reaction included the teachers' decisions to use or not use computers, their participation in training, their attitudes about computers in the schools, and the kinds of educational computing utilized.

Procedure

In order to gain access to the schools for this study, the researcher traded the opportunity to do research for computer inservice presentations at each school involved; each principal decided whether to have one, two, or three inservice sessions. The study itself was conducted over the full course of the second semester and culminated during the last week of school.

The MBTI was administered to all teacher participants in mass at each of the three schools. The researcher gave the teachers an overview of the MBTI and told them that the instrument would help indicate how they made judgments and decisions, including their decisions about their jobs as teachers. The MBTI should not be administered without some sort of explanation, so the researcher was allowed approximately an hour to conduct a training session about the MBTI and how teachers could used their knowledge of "psychological type" to enhance their relationships with fellow employees.

The researcher instructed the teachers about maintenance of the student computer logs, and the teachers explained the logs to their students, reminding them periodically to maintain the logs throughout the semester. A log was attached to each computer, so that if the computer moved, the log went with it. The researcher monitored the logging of computer activity as much as possible, but could not be present at all times.

During the semester, the researcher observed each teacher conduct a lesson and engaged in an interview with each teacher. The interview information and the student log information was compared to the four MBTI dyads and analyzed for statistical significance.

Data Analysis

The data analysis first employed chi-square tests of independence to evaluate relationships between teachers' use/nonuse of educational computing and "psychological type." Then among teachers who used educational computing with their students, the chi-square statistic tested relationships between the teachers' "psychological type" and patterns of computer utilization. Data from the interviews were grouped according to emergent categories, reported with summary statistics, and then analyzed with the chi-square statistic when appropriate. Several questions which measured positive attitude on a Likert-type scale were grouped together and a t-test was conducted to check for differences in the means. For all tests, significance was set at the .05 level.

RESULTS

Of the sixty subjects in this study, 58 were present to take the MBTI. One did not want the results revealed to anyone, including the researcher, so there are 57 valid cases. The frequency distribution of MBTI categories is reported in Figure 3.

Contingency tables were constructed and chi-square tests on each MBTI dyad (E-I, S-N, T-F, AND J-P) revealed no significant relationship between the type of teachers who used instructional computing. and those who did not . However, this measure is limited by two factors : 1) the first school (29 subjects) required all teachers to send some students to the computer lab, and 2) subjects from the other two schools participated on a voluntary basis which might have skewed the data for this measure. A second analysis eliminated the first school and checked for relationships between the second and third schools, both of which housed the computers within the classrooms; no significant relationship was found.

Teachers who used computers at least once during the schoolyear were tested for relationships between their MBTI type and the kind of computer use, as well as for relationships between the MBTI type and which students used the computers. There was no significant relationship found in either of the tests. The type of computer activity in each of the three schools was solely drill and practice, with two exceptions; school one taught sixth grade students to use a word processor and school two allowed some students to use some popular simulation software. Unfortunately, the word processor use was not tied into the curriculum, so students did not apply the tool to their work.. Also, the students at school two usually spent less than 10 minutes at the computer, making it difficult to complete a simulation.

The chi-square statistic revealed a significant relationship between specific MBTI dyads and several dependent variables: the amount of training teachers had taken through district-supported computer classes (with E-I), feeling of adequacy of training (with S-N), whether or not the principal encouraged computer use (with S-N), factors which make it difficult to use

instructional computing (with J-P), and opinion about the quality of available software (with J-P and T-F).

District-Supported Computer Classes. It appears that the majority of both E and I types had taken no district computer classes at all, but the percentage of those who neglected classes was larger among introverts than extroverts. About one-fifth of the extroverts had taken one class (see Table 1).

Adequacy of Computer Training. Although sensing and intuiting people had equivalent amounts of training, the feelings of adequacy of that training was not independent on the S/N variable. Most Ss and Ns believed that their training was totally inadequate, but on the whole Ss indicated less satisfaction with their preparation than Ns (see Table 2.

Principal's Encouragement to Use Computers. The reactions of the teachers to district or principal encouragement to use computers is significantly related to their S-N type. A larger percentage of Ns reported either no encouragement all or encouragement through training opportunities within the district, while a large percentage of Ss claimed that the district or principal encouraged computer use by providing hardware or software. In other words, the Ns perceived themselves as receiving little support, but if they wanted training they could seek it through district computer classes. Ss believed there was more tangible support offered within their immediate work situation (see Table 3).

Factors Which Make it Difficult to Use Computers. Judging and perceptive people did not agree on the things that make it hard to use computers within a school setting. Table 4 shows a significant relationship the teachers' J-P type and their answers regarding obstacles to Instructional computing. The majority of judging people believed that the computer lacks meaning within the curriculum, while the largest consensus among perceptive people revealed access to equipment (both hardware and software) as the largest deterrents to computer use

Quality of Educational Software. The teachers' responses to the quality of educational software showed a significant relationship between their viewpoints and both the J-P and T-F MBTI dyads. Most judging people and feeling people claimed that educational software is of good quality, while a large percentage of perceptive people and thinking people believed that they were unqualified to answer the question. In other words, the perceptive people and thinking people did not know what to think of the quality of educational software, while the judging people used logic and the feeling people used values to determine that the software was of good quality (see Tables 5 and 6).

Finally, differences in the means of the teachers' positive attitude toward computers based on their MBTI types was measured for significance with a t-test. The test revealed that the mean was slightly more positive than neutral for each group; no group was very positive and no group was very negative. There were no significant differences in degree of positive attitude between any of the MBTI types.

According to observations and teachers interviews, the school principal was the most influential person in determining how computers were used in each school. The principal was responsible for encouraging and providing direction for computer use. Each principal made decisions about how computer resources would be acquired and distributed among teachers and students. And, the degree of faculty and staff involvement closely reflected the principal's direction.

The first school had a principal who actively promoted computer usage for all students. Although the majority of the computer resources were purchased with Chapter I funds, the principal placed the computers in a laboratory setting and encouraged all teachers to send students to use the lab on a weekly basis. This principal established a committee of teachers to deal with computer-related issues and actively sought the committee's recommendation prior to making final decisions. Teachers in this school believed that the principal actively helped them to learn about computing. This principal welcomed the researcher and encouraged the researcher

to get involved with the school's computer curriculum. The principal planned to increase each teacher's lab time from one 20-minute session per week to two 20-minute sessions per week during the next school year. The major factor inhibiting the teachers' involvement with instructional computing was the lab situation. While the lab aide conducted the computer sessions with a partial class of students, the teachers kept the remaining students in the classroom or completed other duties. The teachers did not feel motivated to sharpen computer skills because they believed they would not need the skills nor get a chance to use the skills with their students. As a result, the computer lab operated without the benefit of curriculum coordination with the classroom activities. The researcher conducted three inservice training sessions for the teachers at this school. All were well-attended; probably because the principal was trying to get additional computers to place within classrooms for the following year.

The principal at the second school did not seem very supportive of the computer curriculum. That principal was not available to meet with the researcher and did not have a plan to help teachers use the computers with the students. The computers were distributed among the classrooms so that each grade level (three classes of approximately 30 students) shared one computer. There was a limited supply of software which was housed in the library/media center with hopes that it would be available for teachers to check out. Unfortunately, the software was in a state of chaos, with no organization and no clear instructions for teachers about the content or workings of the software. Most teachers were very hesitant to explore the computers or software on their own and as a result, the computers were used by a limited number of classrooms. The method of distributing one computer per grade level might be sound in theory, but in actual practice this method allowed some of the computers to remain totally unused for the schoolyear; few of the teachers in this school sought a computer with gusto. One teacher believed the computer in her classroom didn't work, but the researcher found that it was not plugged in and the teacher did not know how to insert a disk. In a similar situation, a teacher knew there was a computer to share among three classrooms, but did not realize that it had been in her classroom all year (nor did her two colleagues know which room it was in since they had no interest in using it). The researcher planned to conduct two inservice training sessions in the spring, but due to demoralization of the teachers, that did not happen. A large number of teachers came to the first session, but only to announce that there was no point in receiving the training. The principal had decided to use a lab situation the following schoolyear and restrict the computers to Chapter I students, who would be supervised by one adult Of course, the teachers were demoralized. This was particularly disappointing in contrast to the original enthusiasm of the staff when they first volunteered to help with the research on instructional computing.

The third school in the study enjoyed a principal who supported instructional computing by setting an example for students and teachers. This principal allowed students to use the computer in the school office as a reward for school accomplishments, academic or behavioral. A teacher, who had been assigned as the computer specialist, supervised rotation of the software and hardware among classrooms. That teacher also conducted two inservice sessions per year and was available for individual consulting on a daily basis. The teachers in this school seemed split on their level of enthusiasm. A particular group of young, enthusiastic teachers volunteered to participate with the study, but several teachers who chose not to use computers also chose not to participate in the study. The principal and the computer specialist decided to put the computers in a lab during the next year and provide software via a networked system.

It appears that more teachers believe their students are using computers than is the case. This is evidenced by the fact that 14 teachers admitted not using computers at all during the school year, but the student logs revealed that 22 teachers did not send students to the machines. Perhaps teachers feel that they must claim a willingness to send students to use computers. If that is not the case, then perhaps students were forgetting to fill out the log sheets. In any case, students were not getting any high-level use of computers in any of these three schools. All exercises dealt with running drill and practice software, or learning to manipulate a word processor, but not actually using the word processor for productive purposes. Only one teacher felt well-enough trained to incorporate computers into the curriculum at all; the others simply had the students run drill and practice software that was unrelated to their classroom work. Only two teachers actually had all of their students use computers during some point in time. The

pattern of student usage indicates that the teachers are letting advanced and average students use the computers more than the remedial students, but that not all average and advanced students in a classroom use the computers either. Rather, the most popular method of allowing usage was to select specific students from among the class to use the computer. Those specific students were usually those who had their other work completed, and the computer activity was not coordinated with classroom work. These general patterns carried across all three schools and all MBTI types.

CONCLUSIONS

The principal is a very influential to the course of instructional computing. The principal not only makes decisions which affect the students and computer equipment, but which also greatly affect the teachers and their attitudes toward instructional computing. A supportive, informed principal is needed to promote and maintain enthusiasm for instructional computing among the teachers.

There is a need to find a way to help introverts get started with district computer classes. Introverts like thinking about ideas, so training for them might consist of several problems or meaningful challenges to complete. Such meaningful training does not simply lecture or deal with the abstract, but involves the learner in the learning process. Also, pay particular attention to making the training meaningful to sensing-type people. These people need to feel that the training is worthwhile in terms of the curriculum as well as their ability to master the manipulations of the hardware.,

Although sensing people feel that access to hardware and software are helpful, the intuitive people will need more than just equipment. School districts will need to make sure to provide training that is specific to the equipment and software that they are placing in the schools so that intuitive people will feel comfortable using that equipment.

Teachers need training in software evaluation so that they can tell good software from poor software. They also need training in incorporating the computer into the curriculum so that it can be used meaningfully. Without such direction we will probably see teachers continue to send students off to computers to run low-level software and never take advantage of the opportunity to link the computers to their classes in a meaningful way.

Construct a better way to observe actual student usage of the computers so that information can be collected in a more systematic, accurate manner. This study was able to show that teachers do tend to send students of mixed ability to use computers, but that access is often based on getting other work finished first. Although there is no significant test of this, the trend is obvious within the student logs and the teachers' interviews. In order to provide equitable access to instructional computing, teachers will need to consider both the quantity and quality of students' time at the computer. And to enable teachers to do so means supporting teachers with meaningful training.

The ideal situation might include specific training techniques aimed at particular MBTI types, but in reality that will probably have little chance of being addressed.. An alternative is to realize that teachers do have different MBTI types which affect their judgments and decisions about instructional computing. When possible, consider the relationships revealed as significant in this study and direct training to accommodate the different preferences, rather than just one. For example, trainers need to realize that S types need to be taught how to generalize beyond immediate facts, that N types need to become more accepting of traditional methods, that S and P types respond well to rewards, and that N types need to be coached to pay more attention to detail (Myers, 1975). Myers also found that different MBTI types respond differently to different styles of instruction, so trainers need to balance their method of delivery between Bruner's, Gagne's, and Ausubel's methods if they are to address a mixed group of MBTI types..

REFERENCES

Alvarado, A. J. (1984, April). Computer Education for ALL Students. *The Computing Teacher*, 11 (8), 14-15.

Anderson, R.E., Welch, W. W. and Harris, L. J. (1984, April). Inequities in Opportunities for Computer Literacy. *The Computing Teacher*. 11 (8), 10-12.

Barbour, A. (1989, Jan.). Meeting the Literacy Challenge. *Electronic Learning, Special Supplement*.

Becker, H. J. (1986). Instructional Uses of School Computers. Reports from the 1985 National Survey. Center for Social Organization of Schools, The Johns Hopkins University.

Berman, P. & McLaughlin, M. (1976). Implementation of Educational Innovation. *Educational Forum*, 40 (3), pp. 345-370.

Brightman, H. J. (1984, Feb.) Improving Principals' Performance Through Training in the Decision Sciences. *Educational Leadership*, 41 (5), 50-56.

Brightman, DeNovellis, R. & Lawrence, G. (1983). Correlations of Teacher Personality Variables (Myers-Briggs) and Classroom Observation Data. *Research in Psychological Type*, 6, 37-46.

Cuban, L. (1986). *Teachers and Machines: the Classroom Use of Technology Since 1920.* New York: Teacher's College Press.

Dettmer, P. (1981, Winter). Improving Teacher Attitudes Toward Characteristics of the Creatively Gifted. *Gifted Child Quarterly*, 25 (1), 11-16.

Edwards, C. (1984, April. Achieving Equity. *The Computing Teacher*, 11 (8), 62-64.

Fullan, M. (1982). *The Meaning of Educational Change.* New York: Teachers College Press.

Graves, W. H. & Graves, L. H. (1973, Dec.) Analysis of Feedback among Group Practicum Members. *Counselor Education and Supervision*, 13 (2), 111-116.

Guba, E. & Lincoln, Y. (1981). Effective Evaluation. San Francisco: Jossey-Bass.

Jungck, S. (1985). *Doing Computer Literacy: An Ethnographic Study of Curriculum Development and Implementation.* Doctoral Dissertation at the University of Wisconsin-Madison.

Knupfer, N. (1987a, April) A Survey of Teachers' Perceptions, Opinions, and Attitudes about Instructional Computing: Implications Regarding Student Equity. Paper presented at the annual meeting of the American Educational Research Association in Washington, D. C.

Knupfer, N. (1987b). A Survey of Teachers' Perceptions, Opinions, and Attitudes about Instructional Computing: Implications Regarding Equity. Doctoral dissertation. University of Wisconsin - Madison. Being processed.

Lautenberg, Senator F. R. (1984, April). Equity in Computer Education. The Computing Teacher, 11 (8), 13-14.

Lesgold, A. M., & Reif, F. (1983, June). *Computers in Education: Realizing the Potential.* Chairmen's Report of a Research Conference, Pittsburgh, Pennsylvania, November 20-24, 1982. Washington, D.C.: U.S. Government Printing Office.

Myers, I. B., (1975). the Myers-Briggs Type Indicator Manual. Palo Alto, CA: Consulting Psychologists Press.

Myers, I. B. (1962). *The Myers-Briggs Type Indicator Manual.* Princeton, N.J.:Educational Testing Service

Myers, I. B. & McCaulley (1985). Manual: A Guide to the Development and Use of the Myers-Briggs Type Indicator. Palo Alto, CA: Consulting Psychologists Press.

Nathan, J. (1983). Free to Teach--Achieving Equity and Excellence in Schools. New York, NY: Pilgrim Press.

O'Brien, R. T. (1985, May). Using Jung More (And Etching Him In Stone Less). *Training*, 22 (5), 53-66.

Patterson and McLellen (1986) State Efforts to Encourage Effective Technology Use in Schools. A research proposal.

Schubert, J.G. and Bakke, T. W. (1984, April). Practical Solutions to Overcoming Equity in Computer Use. *The Computing Teacher,* 11 (8), 28-30.

Sheingold, K., Kane, J., Endreweit, M., and Billings, K (1981, February). *Issues Related to the Implementation of Computer Technology in Schools: A Cross-Sectional Study.* New York: Bank Street College of Education.

Weinshank, A. B., Trumbull, E. S., & Daly, P. L., (1983). the Role of the Teacher in School Change. In L. S. Shulman & G. Sykes (Eds.), *Handbook of Teaching and Policy.* New York: Longman.

Figure 1 - Four Myers-Briggs Dyads

Extroversion ---------- ATTITUDE TOWARD LIFE ---------- **I**ntroversion

Sensing ---------- PERCEPTION ---------- I**N**tuition

Thinking ---------- JUDGMENT ---------- **F**eeling

Judging ---------- ATTITUDE FOR DEALING WITH THE ENVIRONMENT ---------- **P**erceptive

Figure 2 - Sixteen Myers-Briggs Combinations

	Sensing Types		Intuitive Types	
	w/Thinking	w/ Feeling	w/ Feeling	w/ Thinking
Introverts				
Judging	ISTJ	ISFJ	INFJ	INTJ
Perceptive	ISTP	ISFP	INFP	INTP
Extroverts				
Perceptive	ESTP	ESFP	ENFP	ENTP
Judging	ESTJ	ESFJ	ENFJ	ENTJ

Figure 3 - Frequencies of MBTI Types

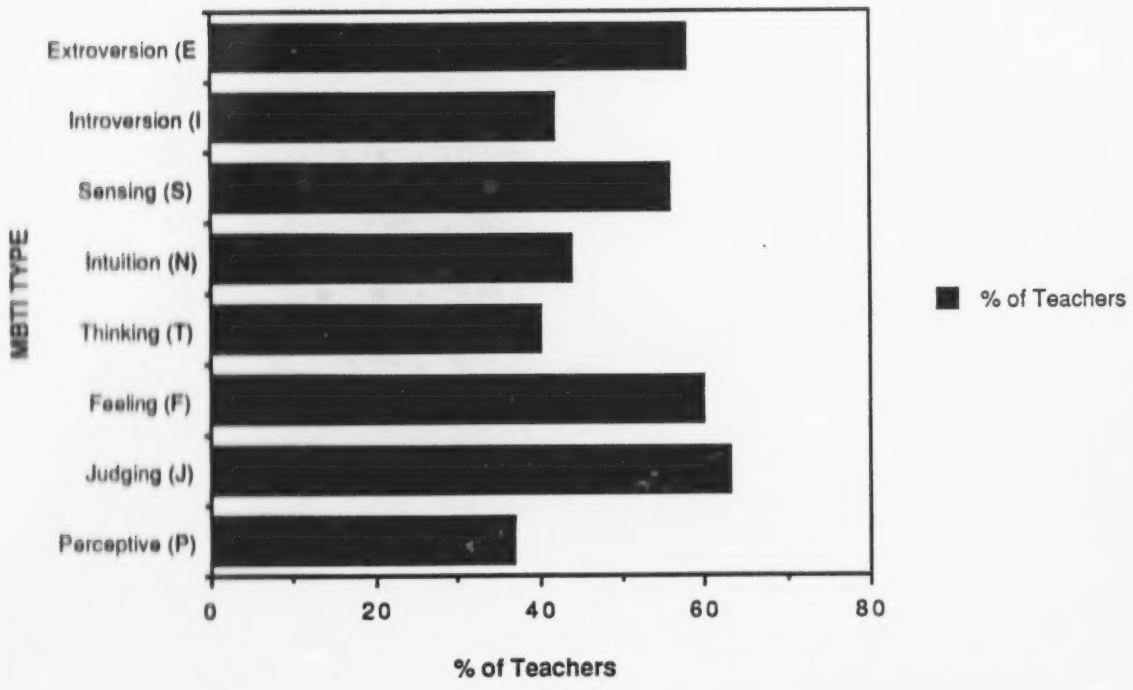

Table 1 - Number of District Computer Classes by E/I

COUNT EXPECTED COLUMN % TOTAL %	EXTROVERT (E)	INTROVERT (I)
DISTRICT CLASS		
None	26	21
	27.2	19.8
	78.8%	87.5%
	45.6%	36.8%
One	7	1
	4.6	3.4
	21.2%	4.2%
	12.3%	1.8%
Two	0	2
	1.2	.8
	0%	8.3%
	0%	8.3%
COLUMN TOTAL	33	24
	57.9%	42.1%

CHI-SQUARE = 5.75 SIGNIFICANCE = .05

Table 2- Adequacy of Training by S/N

COUNT EXPECTED COLUMN % TOTAL %	SENSING (S)	INTUITION (N)
ADEQUATE TRAINING		
Totally Inadequate	15 15.2 46.9% 26.3%	12 11.8 48.0% 21.1%
Somewhat Inadequate	6 3.4 18.8% 10.5%	0 2.6 0% 0%
Adequate	4 7.9 12.5% 7.0%	10 6.1 40.0% 17.5%
Somewhat Adequate	2 1.1 6.3% 3.5%	0 .9 0% 0%
Very Adequate	5 4.5 15.6% 8.8%	3 3.5 12.0% 12.0%
COLUMN TOTAL	32 56.1%	25 43.9%
CHI-SQUARE = 10.70		SIGNIFICANCE = .03

Table 3 - Is Computer Use Encouraged? by S/N

COUNT EXPECTED COLUMN % TOTAL %	SENSING (S)	INTUITION (N)
IS COMPUTER USE ENCOURAGED?		
Not At All	4 7.3 12.9% 7.3%	9 5.7 37.5% 16.4%
Computers Available	21 16.3 67.7% 38.2%	8 12.7 33.3% 14.5%
Training Offered	6 7.3 19.4% 10.9%	7 5.7 29.2% 12.7%
COLUMN TOTAL	31 56.4%	24 43.6%

CHI-SQUARE = 7.05 SIGNIFICANCE = .02

Table 4 - What Makes it Hard to Use Computers by J/P

COUNT EXPECTED COLUMN % TOTAL %	JUDGING (J)	PERCEPTIVE (P)
MAKE IT HARD		
Do Not Know	4 5.6 11.4% 7.1%	5 3.4 23.8% 8.9%
Access	12 11.9 34.3% 21.4%	7 7.1 33.3% 12.5%
Meaningful Training	16 11.2 45.8% 28.6%	2 6.4 9.5% 3.6%
Space	0 1.3 0% 0%	2 .8 9.5% 3.6%
Time	3 5.0 8.6% 5.4%	5 3.0 23.8% 8.9%
COLUMN TOTAL	35 62.5%	21 37.5%
CHI-SQUARE = 12.13		SIGNIFICANCE = .03

Table 5 - Opinion of Software Quality by J/P

COUNT EXPECTED COLUMN % TOTAL %	JUDGING (J)	PERCEPTIVE (P)
SOFTWARE QUALITY		
Do Not Know	6 9.3 17.6% 10.9%	9 5.7 42.9% 16.4%
Terrible	2 3.7 5.9% 3.6%	4 2.3 19.0% 7.3%
Good	19 16.1 55.9% 34.5%	7 9.9 33.3% 12.7%
Excellent	7 4.9 20.6% 12.7%	1 3.1 4.8% 1.8%
COLUMN TOTAL	34 61.8%	21 38.2%

CHI-SQUARE = 8.71 SIGNIFICANCE = .03

Table 6- Opinion of Software Quality by T/F

COUNT EXPECTED COLUMN % TOTAL %	THINKING (T)	FEELING (F)
SOFTWARE QUALITY		
Do Not Know	7 6.0 31.8% 12.7%	8 9.0 24.2% 14.5%
Terrible	5 2.4 22.7% 9.1%	1 3.6 3.0% 1.8%
Good	6 10.4 27.3% 10.9%	20 15.6 60.6% 36.4%
Excellent	4 3.2 18.2% 7.3%	4 4.8 12.1% 7.3%
COLUMN TOTAL	22 40.0%	33 60.0%

CHI-SQUARE = 8.40 SIGNIFICANCE = .03